



## DELIVERING THE AUSTRALIAN RAIL RISK MODEL

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### SUMMARY

For many years RISSB has promoted the idea that Australia, like some other railways, should have a national rail safety risk model as a consistent, objective, quantitative and user-friendly tool to help rail companies understand their safety risk better. But without the authority to compel industry to undertake such a project, RISSB relied on a strategy of building support, i.e. selling the project on its merits. RISSB has had much success in this; by late 2016 the ARRM project began in earnest. Not only is this a win for Australian rail 'safety and risk management' (IRSC theme 4), it's a win for 'innovation and collaboration' (IRSC main theme).

### INTRODUCTION

Australian rail safety is dictated by our Rail Safety National Law (RSNL). The RSNL requires rail companies take a risk based approach in managing safety. As a starting point, operators must have a comprehensive understanding of the level and nature of risk their operations pose and where (in those operations) that risk arises. As the RSNL isn't prescriptive about the risk methodologies rail companies employ, a wide range of approaches (and differing levels of maturity) can be seen across the nearly 200 accredited rail companies around Australia.

### AUSTRALIAN RAIL'S COREGULATION REGIME

The aforementioned RSNL imposes the duty on rail organisations to provide a safe railway 'So Far As Is Reasonably Practicable' and the Office of the National Rail Safety Regulator (ONRSR) administers that law. Rail companies build themselves a Safety Management System (SMS) which describes how they will meet that legal duty, and if that SMS is acceptable to the ONRSR then they are accredited to engage in the specified rail operations. I.e. the industry decides how it will manage safety, and the regulator ensures that they do it!

## RAIL INDUSTRY SAFETY AND STANDARD BOARD

RISSB is a non-mandatory, not for profit company wholly owned by its funding members. RISSB's core business is the development and management of nationally applicable rail industry standards, rules, codes of practice and guidelines. We're accredited by the Standards Australia Board, through their Standards Development and Accreditation Committee, as a Standards Development Organisation. All new standards commenced by RISSB after 31 July 2007 are published as Australian Standards.

RISSB is essentially in the business of creating tools for rail companies to use within Australia's coregulatory arrangement. Because RISSB is a national body (rather than focussing on individual rail companies) utilisation of these tools has the added benefit of improving standardisation/harmonisation at a system level thereby driving out costs, bringing economies of scale and improving system performance.

## THE ARRM PROJECT

The fundamental objectives of the ARRM project were to produce a user friendly web based risk model for the rail industry that will enhance risk analysis while minimising the reporting burden on industry. It was to provide:

- A tool to support industry in analysing risk through;
  - A national safety risk profile for the Australian rail industry that can be drawn down and applied by individual operators and sectors of the industry;
  - Access to tailored risk data (and risk reports) according to organisational requirements;
  - A greater 'pool' of information – thereby increasing robustness of risk analyses,
  - The ability to benchmark risk (anonymously where necessary) against industry peers;
  - Confidence that industry and the Regulator are both guided by the same national safety risks - reinforcing coregulation;
- The underpinning for a smarter standards regime; and
- Valuable information to support investment and location decisions (e.g. which line, or which level crossing etc. to upgrade) by investors.

Because of the disparate, and dispersed nature of Australia's railways the project to deliver ARRM has had some unique challenges to overcome; some paradoxically arising out of the coregulatory regime we enjoy here. And while ARRM has had the advantage of being able to learn from risk models elsewhere, it also has some unique features that have required pioneering of new approaches.

ARRM's interim deliverables have included:

- Risk model plan
- Data strategy
- Operationalisation estimate
- Operating pilot (proof of concept)
- Risk model (beta)
- Future data strategy
- Testing
- Risk model (completed system)
- Training

It's taken over 12 months of work building towards ARRM's official launch on the 20<sup>th</sup> November at AusRAIL - Australasia's Leading Rail Conference and Exhibition.

#### INDUSTRY COLLABORATION IN ARRM

The ARRM project has been characterised by significant levels of collaboration, taking input from around 100 rail experts at various workshops, meetings and other fora; ARRM carries the official endorsement of over 20 Australian rail companies.

#### FEATURES AND FUNCTIONALITY OF ARRM

ARRM analyses risk over several dozen hazardous events down to precursor level across the broad categories of:

- Collision
- Derailment
- Slip / trip / fall
- Hazardous environment
- Fire
- Explosion
- Assault
- Suicide
- Projectiles
- Injuries other than slip / trip / fall
- Road accident

It includes features such as; the ability for individual rail companies to interrogate their risk information (rather than just view a national average) and compare it to a scaled, aggregated mix of other similar rail operations, and the inclusion of estimates of uncertainty in risk information.

## ARRM ARCHITECTURE

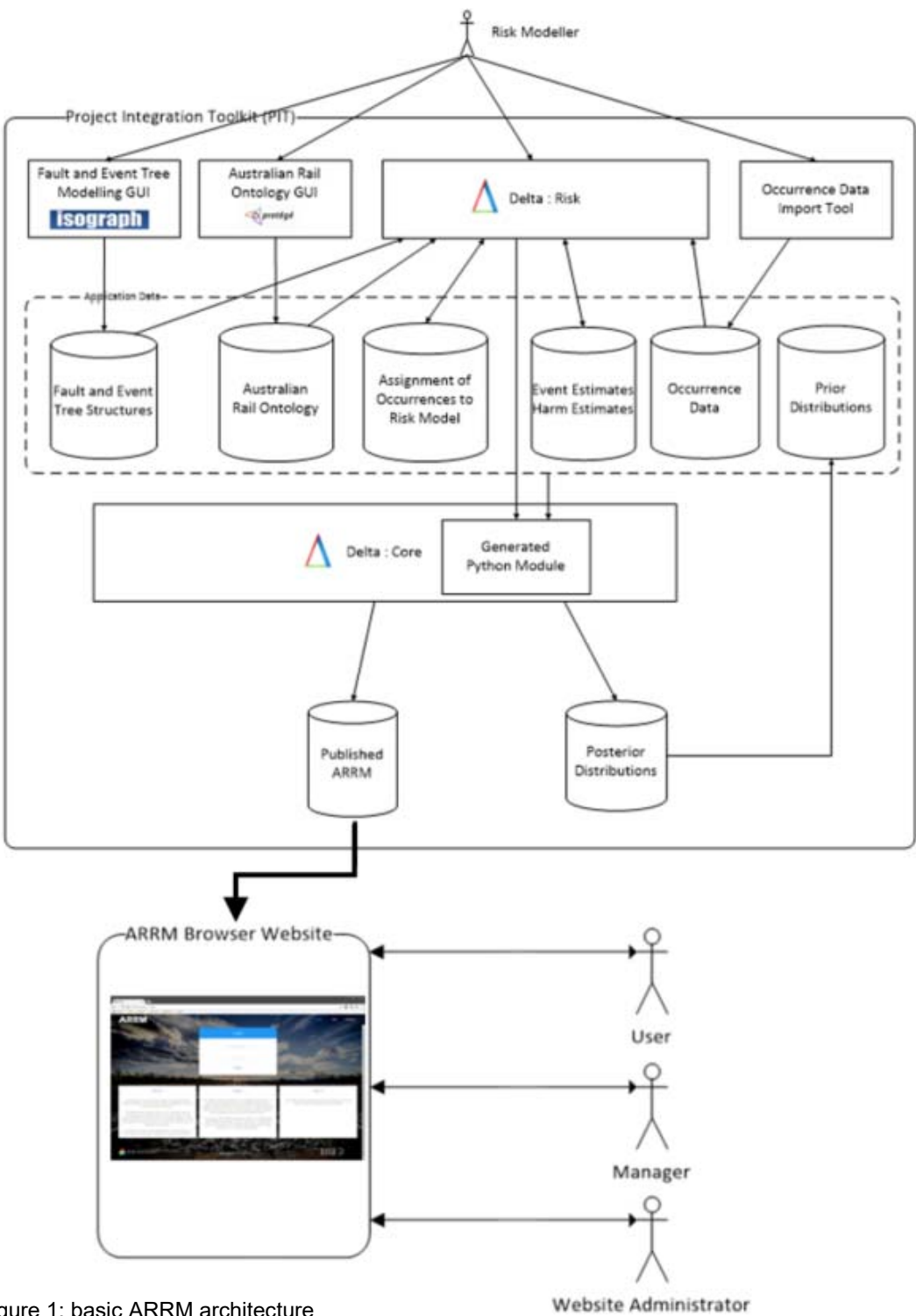


Figure 1: basic ARRM architecture

Figure 1 shows the basic architecture of ARRM where:

Isograph Reliability Workbench is a proprietary suite of reliability, safety and maintainability software. ARRM uses it for the Fault and Event Tree Modelling Graphical User Interface. It is used for creating and editing ARRM's Fault Trees and Event Trees, as well as capturing some basic information such as identifiers and descriptions.

The ontology includes the names of all the RTOs in Australia and various 'facts' e.g. the characteristics of the railways that they operate and/or maintain.

The Delta tool is another proprietary piece of software to improve the efficiency of annotating and associating of (the very large amounts of!) occurrence data, with the risk model.

Python code is utilised for efficiently reading and parsing input data from the variety of data sources.

## CONCLUSION

RISRB is very proud to have led the industry on this important project. When ARRM goes live in November this year, we'll be providing rail companies with high quality risk information for them to utilise in their decision making. We'll see a better-informed railway, making better decisions leading to improved safety – building on Australian Rail's already impressive safety record.